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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	PAPER NUMBER
1753	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/926,041	SATO ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,18-20,24 and 25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,18-20,24 and 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9-17-03 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazuyoshi Akiyama et al. (Japan 11-345780) or Kazuyoshi Akiyama et al. (U.S. Pat. 6,250,251)

Kazuyoshi Akiyama et al. '780 teach a surface part of a vacuum deposition apparatus that has a range of ten-point means roughness (Rz) of 5 to 200 microns and a range of a mean interval S of local ridges of 5 to 100 microns. (See Abstract) This prevents film peeling within a reaction container during deposition film formation. (See Machine translation [0006]) One can calculate the Rz value from the formula in Figure 4 by JIS B 0601. One can calculate the S value from the formula in Figure 5. (See Machine translation [0016]) As the film formed on the surface part a metallic material such as aluminum, Cr, Mo, Au, In, nickel, Ti, Pt, Fe(s) and these alloys can be used. The method for forming this raise film can be the plasma metal spray method. (See Machine translation [0023])

OR

Kazuyoshi Akiyama et al. '251 teach a surface part of a vacuum deposition apparatus that has a range of ten-point means roughness (Rz) of 5 to 200 microns and a range of a mean interval S of local ridges of 5 to 100 microns. (See Abstract) This prevents film peeling within a reaction container during deposition film formation. (Column 2 lines 25-36) One can calculate the Rz value from the formula in Figure 4 by JIS B 0601. (See Figure 4) One can calculate the S value from the formula in Figure 5. (See Figure 5) As the film formed on the surface part a metallic material such as aluminum, Cr, Mo, Au, In, nickel, Ti, Pt, Fe(s) and these alloys can be used. The

method for forming this raise film can be the plasma metal spray method. (Column 8 lines 62-68; Column 9 lines 1-10)

The differences between Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 and the present claim is that the Rv and Rp values are not taught and the range of Rp – Rv values is not discussed.

Since the Rz value is between 5 to 200 microns the Rv and Rp values fall within Applicant's claimed range. The Rv and Rp values are seen in Figure 4 as Yp and Yv values. (See Figure 4) The ten point mean roughness is a measure of ten points of roughness which includes Rv and Rp. Rv and Rp from JIS 0601-1994 cited in the record by applicant is indicative of the maximum height. (i.e. from JIS Ry=Rv+Rp) The ten point mean roughness is a measure of the highest peak profiles which would necessarily include Rz and Rp values which are the maximum highest peak profiles available. Since Rz ranges from 5 to 200 microns and requires the maximum highest peak profiles Rz encompasses values of Rz and Rp from 20 to 70 microns because the ranges overlap.

As to the range of the (Rp-Rv) values it is believed that since the Rz and Rp values of the pending claims are suggested by Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 that the range of (Rp-Rv) values is suggested by Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251.

The motivation for utilizing a film of a certain roughness value is that it allows for preventing film from peeling from the reaction container during deposition film formation. (See Abstract of Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251)

Therefore, it would have been obvious to coat a component with a film of a certain roughness value as taught by Kazuyoshi Akiyama et al. '780 or '251 because it prevents the film from peeling from the reaction container during deposition film formation.

Claims 1-4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kazuyoshi Akiyama et al. (Japan 11-345780; Machine translation) or Kazuyoshi Akiyama et al. (U.S. Pat. 6,250,251) in view of Michio et al. (U.S. Pat. 09-272965; Machine translation).

Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 are discussed above and all as applies above. (See Kazuyoshi et al. '780 or '251 discussed above)

The differences between Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 and the present claims is that the thermal expansion coefficient of the film layer is not discussed, where two or more layers are utilized is not discussed, the Vicker hardness of the coating is not discussed and the thickness of the coating is not discussed.

Michio et al. teach parts 1 for a vacuum film forming device has the main body 2 of the parts and sprayed film 3 formed on the surface of the main body 2. The vacuum film forming device has a holding part for the sample to be film-coated such as a substrate holder arranged in a vacuum vessel, a film forming source such as a target arranged opposite to the holding part for the sample to be film-coated, film forming source holding parts such as a target outer circumference press and a center cap and sticking preventing parts. Among these, at least one selected from among the holding

part for the sample to be film-formed, film forming source holding parts and sticking preventing parts is constituted of the above parts for a vacuum film forming device, target and backing plate. (See Abstract)

The thermal sprayed film material has a metallic material with a thermal coefficient below 10*10-6/K. (Machine translation [0020]) The surface roughness of the film is from 5-50 micrometers. The thickness of the film is from 50 to 500 micrometers. (Machine translation [0015])

The thermal spraying film 3 consists not only of the coat by single material but of a material different, for example. The thermal spraying film 3 may consist of coats of more than two-layer. When applying the thermal-spraying film 3 more than two-layer, as for the differential thermal expansion between tem, it is desirable to carry out to below 10*10-6/K like the differential thermal expansion of the thermal-spraying film 3, and the main part 2 of parts and membrane formation material. (Machine translation [0030])

Ti thermal spray film can be used. (Machine translation [0044])

The motivation for utilizing a two layer film of specified thickness is that it allows for preventing the generation of defects in wiring films. (See Abstract)

As to the Vickers Hardness since both Kazuyoshi et al. '780 or '251 and Michio et al. teach spray coating a metal such as Titanium it is presumed that such spray process would produce a film having the required Vicker hardness since Applicant utilizes spray coating to produce their film. (See Kazuyoshi et al. '780 or '251 and Michio et al. discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified by Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 by utilizing a layer comprised of a single or two layers with particular coefficient of thermal expansion and thickness as taught by Michio et al. because it allows for preventing the generation of defects in wiring films.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 in view of Michio et al. as applied to claims 1-4, 6 and 7 above, and further in view of Bang et al. (U.S. Pat. 6,235,120).

The differences not yet discussed is the layers relieving stress.

Bang teach in FIG. 1A a side elevational view, generally representing a processing chamber part 11, configured in accordance with the present invention. The processing chamber part 11 comprises an underlying part 13 having a first CTE, an intermediate coating 15 having an intermediate CTE, and a surface layer 17 having a second CTE. The underlying part 13 exhibits one or more bulk characteristics which are favorable, and one or more surface characteristics which are unfavorable, and the surface layer 17 exhibits at least one surface characteristic which is favorable, and which is unfavorably possessed by the underlying layer 13 (e.g., the underlying part 13 is corrosive in the processing environment and the surface layer 17 is not corrosive in the processing environment). The intermediate coating 15 is comprised of a plurality of intermediate layers 19a-e, as shown in FIG. 1A, each of which has an intermediate CTE. As used herein, an intermediate CTE refers to a CTE value that falls within the

range between the CTE value of the underlying part 13 and the CTE value of the surface layer 17. (Column 2 lines 50-68; Column 3 lines 1-9)

FIG. 1B is a side elevational view representing the part of FIG. 1A at an elevated temperature. FIG. 1B is useful for understanding how the inventive processing chamber part 11 reduces the selection criteria for each material layer. (Column 3 lines 16-19)

For example, assume the underlying part 13 has a CTE of 7.times.10.sup.-6/c, and the surface layer 17 has a CTE of 1.times.10.sup.-6/c. The difference in CTE, in this example 6.times.10.sup.-6/c, is proportional to the overall thermal stress that would exist between the underlying part 13 and the surface layer 17 if no intermediate coating 15 existed therebetween. Preferably, to gradually reduce the overall thermal stress, each intermediate layer 19a-e reduces the overall thermal stress by an equivalent amount, in this example by an amount proportional to 1.times.10.sup.-6/c. To achieve equal thermal stress reduction, intermediate layer 19a has a CTE of 6.times.10.sup.-6/c, intermediate layer 19b has a CTE of 5.times.10.sup.-6/c, intermediate layer 19c has a CTE of 4.times.10.sup.-6/c, intermediate layer 19d has a CTE of times.10.sup.-6/c and intermediate layer 19e has a CTE of 2.times.10.sup.-6/c. Accordingly, during thermal cycling, stress between any two adjacent layers is proportional to 1.times.10.sup.-6/c, 1/6 the stress that would exist in the absence of the intermediate coating 15. (Column 3 lines 20-36)

Moreover, material selection is facilitated, as both the materials of the underlying part, and of the surface layer may be selected for their respective bulk, and surface characteristics, without regard for CTE matching. Thus, the present invention greatly

increases the universe of acceptable materials for underlying parts and for surface layers, allowing semiconductor processing chamber parts to be easily tailored to meet the requirements of a given process. Similarly, with use of the present invention, materials for the intermediate layers 19a-e may be freely selected without regard for surface characteristics--the primary consideration for selection of an intermediate layer 19a-e being the desired CTE. (Column 3 lines 53-65)

The processing chamber part 11 represents any number of processing chamber parts (e.g., process kit parts, heaters, chamber walls). For example, the underlying part 13 may be a heating layer (e.g., comprising aluminum or aluminum nitride), and the surface layer 17 may be magnesium fluoride, iridium, aluminum trifluoride, etc., each of which exhibits a favorable surface characteristic when employed as a heater coating within a semiconductor device processing chamber. It will be understood that in most instances, the thickness of the intermediate coating, and preferably the thickness of each of the intermediate layers therein, is minimal (i.e., only as thick as is needed to effectively reduce thermal stress). Intermediate coatings of minimal thickness reduce attenuation of the underlying part's favorable characteristics (e.g., heat transfer) and reduce material costs. The intermediate layers 19a-e may be formed by conventional methods (e.g., chemical vapor deposition, physical vapor deposition, plasma spray, diffusion bonding) as will be apparent to those of ordinary skill in the art. (Column 3 lines 66-68; Column 4 lines 1-17)

The motivation for employing coatings that relieve stress is that it allows for employing a variety of coatings for the external coating. (Column 1 lines 5-11)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized stress relieving layers as taught Bang et al. because it allows for employing a variety of coating for the external coating.

Claims 18-20, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Michio et al. (Japan 09-272965) in view of Kazuyoshi Akiyama et al. (Japan 11-345780) or Kazuyoshi Akiyama et al. (U.S. Pat. 6,250,251)

Michio et al. is discussed above and all is as applies above. (See Michio et al. Discussed above) Michio et al. teach the sputtering apparatus with Ti target as seen Figure 3 where components including the target non-erosion portion and backing plate are coated with a peeling preventing film of Ti (See Figure 3) The parameters of the film are discussed above in the discussion of Michio et al.

The difference between Michio et al. and the present claims is that the Rv and Rp values are not discussed, the (Rp-Rv) range is not discussed and the Vickers hardness is not discussed.

As discussed above Kazuyoshi Akiyama et al. '780 or Kazuyoshi Akiyama et al. '251 teach a defect prevention film with the required roughness values. Rv, Rp and (Rp-Rv) values are taught which fall within the range of applicant's claims. (See Kazuyoshi et al. discussed above)

As to the Vickers Hardness since both Kazuyoshi et al. '780 or '251 and Michio et al. teach spray coating a metal such as Titanium it is presumed that such spray process would produce a film having the required Vicker hardness since Applicant utilizes spray

coating to produce their film. (See Kazuyoshi et al. '780 or '251 and Michio et al. discussed above)

The motivation for applying a film with certain roughness parameters and hardness parameters is that it allows for prevention of film release. (See Kazuyoshi et al. '780 or '251 discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Michio et al. by utilizing certain roughness parameters and hardness parameters as taught by Kazuyoshi et al. '780 or '251 because it allows for prevention of film release.

RESPONSE TO REMARKS:

In response to the argument that Kazuyoshi et al.'s Rz feature is distinct from the distance features (i.e. Rv and Rp) of Applicant's claimed invention, it is argued that Rz must include the values of Rv and Rp in order to arrive at the ten point mean roughness. Since Rz includes the range of 5 to 200 microns the values of Rv and Rp would necessarily include values in that range and would overlap Applicant's claimed ranges. As discussed in the interview of July 24, 2003 if Applicant's can show that limiting Rv and Rp in the range of 20-70 microns has unexpected results independent of Rz then the prima facie case of obviousness may be overcome. (See Kazuyoshi Akiyama et al. '780 or '251 discussed above)

In response to the argument that Kazuyoshi Akiyama et al. '780 do not teach the range for (Rp-Rv) it is argued that since Rv and Rp are included in the Rz values as

discussed above that the (Rp-Rv) range of Applicant's claims is within the range of the prior art's range. (See Kazuyoshi Akiyama et al. '780 or '251 discussed above)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 703-308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
October 15, 2003